

Telecommunications system via a principal network of the Internet type and a cabled terminal affording geographically pertinent routing of the communications

The present invention concerns a telecommunications system including:

- . at least one terminal intended to exchange data with a person being called via a principal communication network of the Internet type provided with at least one access controller intended to receive the said data and at least one call controller intended to route the said data to the person being called, and
- . at least one auxiliary communication network intended to implement an interface between the said terminal and the said access controller.

The data conveyed within such systems may for example be voice, audio/video or text data.

In a large number of applications, the geographical location of the calling terminal may constitute a very useful item of information. This information is for example essential when a user of this terminal keys in an abbreviated number in order to be connected rapidly to an organisation able to act at the place from which the said user is sending his call, such as fire-fighting services, or police or emergency medical intervention services.

International patent application WO 01/43395 describes a telecommunications system using a protocol of the Mobile IP type, that is to say in which the user has a mobile terminal, for example a radio telephone, intended to be connected to the person he is calling via a principal network of the Internet type, the auxiliary communication network consisting of a mobile telephony network of the cellular type. This known system makes possible a geographical location of the caller and a taking account of this location information with a

view to a pertinent routing of the data by the call controller, that is to say to a destination address suited to the said geographical location. This telecommunications system for this purpose uses resources offered by the cellular network in accordance with a protocol which provides for each mobile terminal to be able to determine its own geographical location by means of connections which it maintains with the cellular network. The mobile terminal can then supply this location information on request to the call controller with a view to pertinent routing of the call.

In a telecommunications system using a cabled network instead of a cellular network, in order to implement an interface between the terminals and the said access controller, the terminals do not have resources for determining their geographical location by themselves, which does however constitute information which is just as important as in the case of the known telecommunications system.

One of the aims of the invention is to allow a pertinent routing of data sent by a terminal via a principal network of the Internet type and a cabled auxiliary network implementing an interface between the said terminal and the said principal network, offering a telecommunications system in which a geographical location of the said terminal is made possible.

This is because a telecommunications system according to the introductory paragraph is characterised according to the invention in that, the auxiliary communication network being a cabled communication network, the system also includes location management means separate from the terminal and able to generate location information representing a geographical location of the said terminal and to transmit the said location information to the call controller.

The location management means mitigate the inability of the terminal to identify its location by itself. The location information relating to a terminal can consist of an identifier for an item of equipment, for example a telephone line, to which the terminal in question is connected, a telephone subscriber number associated with the said identifier, an administrative address associated with the said identifier, or geographical coordinates indicating a position, read for example by means of a satellite system of the GPS type, of the connection between the terminal and the equipment.

According to a variant of the invention, the location management means can also advantageously be able to collect so-called profile information representing a communication quality which must be provided to a user of the terminal.

This profile information is different from the location information but may be used in combination with the location information in order to improve the functioning of the telecommunications system according to the invention. For example, the system can be provided with a resource controller intended to provide each user with a communication quality in accordance with preferences previously defined by the user and made manifest by the profile information. The resource controller will then permanently carry out an analysis of the state of the network, seeking to distribute a load consisting of an overall flow of information instantaneously routed over the telecommunications system, ensuring that particular requirements in terms of service quality, expressed for example by minimum communication flow values, for compliance with which certain users may have taken out a particular subscription, are taken into account as much as possible. To do this, the resource controller must know profile information relating to the requirements and the equipment of the users who are actually connected to the network, so as to determine which users the resource controller can and must favour, and to what extent. This profile information of a user will consist for example of an identification peculiar to the user allowing him to access the principal network, an identifier of a certain type of access to the principal network which the user will have chosen, or network parameters specific to this user. The profile information may also represent the type of equipment constituting the terminal of the user, in particular a screen size, or a degree of suitability for the processing of multimedia data.

The location and profile information can also be used conjointly by a supplier of access to the principal network in order to invoice the users who subscribe to it for the actual costs of their communications, which will amongst other things be related on the one hand to the distance physically separating a user from the persons he is calling and on the other hand to the resources which will have been used for providing this user with the communication quality which he has required.

In a particular embodiment of the invention, the location management means include a database able to collect information on the one hand from at least one access controller and on the other hand from an information system of at least one operator to which the user of the terminal has subscribed.

The invention also concerns, as an element useful to its implementation, a data recording medium intended to contain a database including information collected by the location management means included in a telecommunications system as described above.

The invention also concerns, as another element useful to its implementation, a server

including a recording medium as described above.

The invention also concerns, as a physical entity resulting from its implementation, a signal containing data intended to be routed from a terminal to a person being called via a principal communication network of the Internet type and a cabled auxiliary communication network, a signal also containing location information representing a geographical location of the said terminal and generated by location management means.

In a more general aspect, the invention also concerns a method of transmitting data between at least one terminal and a person being called by means of a telecommunications system including:

- . a principal communication network of the Internet type provided with at least one access controller intended to receive the said data and at least one call controller intended to route the said data to the person being called, and
 - . at least one auxiliary cabled communication network intended to implement an interface between the said terminal and the said access controller,
- a method characterised in that it includes a step of generating location information representing a geographical location of the said terminal and transmitting the said information to the call controller.

According to a variant of this aspect of the invention, the method described above also includes a step of generating profile information, representing a communication quality which must be provided to a user of the terminal.

The characteristics of the invention mentioned above, as well as others, will emerge more clearly from a reading of the following description of an example embodiment, the said description being given in relation to the accompanying drawings, amongst which:

Fig. 1 is a functional diagram describing a telecommunications system according to a particular embodiment of the invention, and

Fig. 2 is a flow diagram describing a data transmission method implemented in such a system.

Fig. 1 depicts schematically a telecommunications system SYST including a plurality of terminals T11 ... T1p ... TN1 ... TNp intended to exchange data with persons being called CR1 ... CRk via a principal communication network INW of the Internet type provided with access controllers AX1 ... AXN intended to receive the said data, and call controllers CA1 ... CAN intended to route the said data to the persons being called CR1 ... CRk.

In the example described here, the persons being called CR1 ... CR2 and the terminals

T11 ... T1p ... TN1 ... TNp are described as distinct entities in order to facilitate a good understanding of the invention. However, in the majority of the applications for which such a system SYST is intended, each terminal can fulfil indifferently a role of data sender, as is the case here, and person called.

A terminal can for example consist of a telephone, in which case the data to be transmitted will essentially be of a voice nature, or a computer provided with a modem and possibly a microphone and/or a photographic apparatus, in which case the data to be transmitted can be of a text, audio and/or video nature.

The system SYST also includes a cabled auxiliary communication network comprising here telephone equipment TE1 ... TEN and intended to implement an interface between the terminals T11 ... T1p ... TN1 ... TNp and the said access controllers AX1 ... AXN. This telephone equipment can for example consist of automatic exchanges, known per se to persons skilled in the art, and each provided with at least one modem forming a gateway for providing a transfer of data to or from the principal communication network INW.

The system SYST according to the invention also includes location management means LS, separate from the said terminals T11 ... T1p ... TN1 ... TNp, and able to generate location information Lli representing geographical locations of the said terminals and to transmit the said information Lli to the call controllers CA1.

The location means LS mitigate the inability of the terminals T11 ... T1p ... TN1 ... TNp to identify their location by themselves. The location information Lli relating to a terminal T11 ... T1p can consist of an identifier of a telephone line connecting the terminal in question to the equipment TE1, a telephone subscriber number associated with this identifier, an administrative address associated with this identifier, or geographical coordinates indicating a position, read for example by means of a satellite system of the GPS type, of the connection between the terminal T11 ... T1p and the equipment TE1.

When a calling terminal T11 ... T1p seeks the establishment of a communication with a person being called, the said terminal sends a connection request C11 ... C1p to an access controller AX1. The access controller AX1 then identifies the geographical origin of this request by means of the line number of an item of telephone equipment TE1 by means of which the said request C11 ... C1p has reached the said access controller AX1, and possibly by means of an administrative address corresponding to a password annexed to the said request. This information, referred to as access information IE1, is then sent to the location management means LS by the access controller AX1.

In this particular embodiment of the invention, the location management means LS1, which comprise here a server including a memory medium containing a database BD, are also able to consult various information sources associated with databases SIIP1 ... SIIPM belonging to telecommunication operators with which the user of the terminal may have taken out a subscription allowing him access to the principal communication system INW, in order to extract therefrom subscription information IP1 ... IPM, and to include the said subscription information in the database BD.

After authentication of the identity of its user by the access controller AX1, the calling terminal T11 ... T1p will be allocated an address of the Internet address type and connected to the principal communication network INW, and will be able to send data signals CT1 to the person being called.

The purpose of the data signals CT1 ... CTN is to pass via the access controllers AX1 ... AXN in the direction of the call controllers CA1 ... CAN. If a call controller CAi (for i = 1 to N) identifies a data signal CTi as a signal whose subsequent routing depends on the geographical location of the calling terminal, for example an emergency call by means of an abbreviated number, the call controller CAi sends an information request IRQi to the location management means LS for the purpose of having location information LIi relating to the geographical location of the said calling terminal communicated to it.

The call controller CAi will also be able, optionally, to seek, by this same information request IRQi or another request of the same type, profile information PIi representing preferences previously defined by the user of the calling terminal, for example representing a service quality which is to be supplied to this user.

After reception of such a request IRQi, the location means LS analyse the content of the access information IE1 ... IEN supplied by the access controllers AX1 ... AXN on the one hand and subscription information IP1 ... IPM on the other hand and generate, on the basis of the said access and subscription information, the location information LI1, and optionally the profile information PI1, which is then transmitted to the call controller CAi which requested it. This call controller CAi then includes the location information LI1, and optionally the profile information PI1, in the data signal CTi which it received from the telephone equipment TEi via the access controller AXi, and thus generates a signal SDi carrying data sent by the calling terminal on the one hand and location and profile information relating to this terminal on the other hand. This signal SDi then constitutes a self-contained entity containing all the elements of a geographical nature which are necessary to its subsequent routing to its final

destination via the principal network INW, as well as elements contributing to an effective management of the resources of the telecommunications system SYST.

Fig. 2 illustrates, in the form of a flow diagram, a method of transmitting data used in a telecommunications system as described above.

During a first step R(AXi), an access controller AXi receives a connection request from a terminal to which it is connected via the cabled auxiliary network. This access controller AXi then sends the access information IEi to the location management means LS.

During a following step R(BD), the access information IEi is recorded in a database BD included in the said location management means LS. Access to the principal network is granted to the calling terminal, which then sends, via the access controller AXi, a data signal CTi to a call controller CAi.

In a following step R(CAi), the said call controller CAi receives and analyses the said data signal CTi in order to determine whether an identification of the geographical location of the calling terminal is necessary to a pertinent routing of the said data signal CTi. If such is the case, the call controller CAi sends an information request IRQi to the location means LS for the purpose of having location information LIi relating to the geographical location of the said calling terminal communicated to it. The call controller CAi can also, and optionally, seek, by the same information request IRQi or another request of the same type, profile information PIi, representing preferences previously defined by the user of the calling terminal, for example a quality of service which is to be supplied to this user.

During a following step R(LS), the request IRQi is received by the location management means LS, which then consult the content of the access and subscription information IEi and IPi which will have been sent to it by the access controllers AXi and the various databases belonging to telecommunication operators with which the user of the terminal may have taken out a subscription.

During a following step G(LIi+PIi), the location means LS generate the location information LIi, and optionally the profile information PIi, as disclosed above, and then transmit the said information LIi and PIi to the call controller CAi which requested it.

During a following step G(SDi), the said call controller CAi generates a signal SDi which includes the data contained in the signal CTi and the location information LIi, and optionally the profile information PIi, thus forming a self-contained entity containing all the elements of a geographical nature which are necessary to the subsequent routing of the signal SDi, as well as elements contributing to an effective management of the resources of the

telecommunications system SYST.

During a following step T(INW), the said call controller CA_i proceeds with the sending, via the principal network INW, of the said signal SD_i to its destination CR_j, which will receive the said signal SD_i during a following step R(CR_j).

The invention thus allows a pertinent routing of calls sent by a terminal via a principal network of the Internet type and a cabled auxiliary network, although such terminals do not have resources for determining their geographical location by themselves.